

THE SPECIES OF THE GENUS *ERODIUM* L'HÉR. ENDEMIC TO AUSTRALIA.

(With a key to all the taxa known to occur in Australia.)

By R. C. CAROLIN, University of Sydney.

(Twenty-eight Text-figures.)

[Read 28th May, 1958.]

Synopsis.

The specimens previously referred to *E. cygnorum* Nees in Lehm. have been critically examined. Two new species are described (*E. aureum* and *E. crinitum*) and one new subspecies (*E. cygnorum* ssp. *glandulosum*). These all appear to be endemic to the Australian continent, although *E. crinitum* appears to have been reported as a "wool alien" in Yorkshire, England. A key to all the taxa known to occur in Australia and Tasmania is provided.

ERODIUM AUREUM, sp. nov.

Herbae perennes vel annuae, nanae, pilis glandulosis simplicibusque. Folia elongata-deltaidea 3-4-lobis. Calyx ellipticum pilis glandulosis simplicibusque obtegitur. Filamenta staminorum anguste lanceolata aristis longis, purpurea pallide. Pili rufoaurei trans mericarpium ponent.

Dwarf, suberect, short-lived perennial or possibly annual herb. *Stems* 1-3, up to 20 cm. tall, covered with soft glandular and simple hairs. *Leaves* 1.0-3.0 cm. long, 0.7-1.5 cm. wide, lobed with three principal lobes; sinuses never reaching main vein, glandular and simple hairs scattered over surfaces; margins toothed; petioles slender with scattered hairs; stipules and bracts acute. *Flowers* in umbels of (2)-3(5) rarely solitary, pedicels covered with glandular and, fewer, simple hairs. *Sepals* 5, oblong-lanceolate, 0.5-0.8 cm. long, 0.2-0.3 cm. wide, covered with both long glandular hairs and simple hairs, the latter often more numerous towards the apex, shortly mucronate, ciliate and membranous towards margin, particularly where covered in bud. *Petals* 5, blue-purple with reddish veins and bases, ovate, c. 0.8 cm. long and 0.6 cm. wide. *Stamens* 5; filaments narrow lanceolate, less than 0.1 cm. wide at their widest part, 0.45 cm. long including long aristate apex, often purple; anthers red; staminodes 5, similar to staminal filaments, about 2/3 times as long. *Stigmata* 5, yellow. *Mericarps* 5, oblanceolate, c. 0.5 cm. long and 0.2 cm. wide, covered with short golden-brown, simple hairs lying diagonally across the long axis; beak c. 3.5 cm. long with two pits at the base and often 1-2 folds beneath each pit.

Chromosome number: $2n = 20$.

Range: Central Australia, drier parts of South and Western Australia, and extending into western Queensland.

Ecological distribution: Generally in open situations.

Holotype: Palm Valley, G. Chippendale, 26.8.1956. In Herb. N.S.W.

Specimens examined.—SOUTH AUSTRALIA: N. end of Mann Ranges, Cleland, 23.8.1954 (S.A.95641035); Ernabella, Musgrave Ranges, Cleland, 19.8.1933 (S.A.95641016); between Ernabella and Echo Hill, Cleland, 20.8.1933 (S.A.95641019 and 95641021); Echo Hill between Moorilyanna and Ernabella, Cleland, 7.8.1933 (S.A.95641020 and 95641022); Highway between Moorilyanna and Ernabella, Cleland, 7.8.1933 (S.A.95641023); E.-W. line Wynbring, Cleland, 20.8.26 (S.A.95641041); E.-W. line Barton, Black, 22.9.20 (S.A.95641003); E.-W. line Pimba, Cleland, 26.8.39 (S.A.95641015); Gov. (S.A.) North-West Exped., Dr. H. Basedow, 1903, nos. 437, 116 (N.S.W.); Arkaranga Creek, R. Helms, 17.5.1891 (N.S.W.). WESTERN AUSTRALIA: Gnamma Paddock, Glenorn Station, N. T. Burbidge, August, 1938 (W.A.); Herb., O. H. Sargent, no. 1410, rich red loam near York, W.A. (MEL). NORTHERN TERRITORY: Macdonnell Ranges, Strehlow, 1932-3 (S.A.95640011). QUEENSLAND: Queensland border, Cooper's Creek, Gregory South, J. More (Q.001877); Warrego River district, F. M. Bailey (N.S.W.); Parroo River district, E. Betche, 9.1900 (N.S.W.).

ERODIUM CRINITUM, sp. nov.

Herbae perennes suberectae pilis simplicibus albis subrigidis et glandulosis brevissimis instruntur. Folia tri-loba profunde vel palmata. Pedunculi graciles hirsuti. Sepala oblonga anguste vel lanceolata pilis confertis sublaxis instruntur. Filamenta staminorum $1/3$ – $2/3$ -plo longiore staminodium. Pili longi appressi ponentur trans mericarpium.

Sprawling or suberect herbaceous perennial with thick fleshy rootstock. *Stems* 1-numerous, 5–50 cm. tall with long stiff white simple hairs scattered over the surface. *Leaves* 1.5–4.0 cm. long, 1.5–3.0 cm. wide, deeply palmately dissected with three principal lobes; median lobe 1.5–4.0 cm. long, 1.0–2.5 cm. wide; sinuses reaching to midrib, long white simple hairs scattered over surface; margin toothed; petioles slender with scattered simple hairs especially in groove, and very short glandular hairs; stipules and bracts acute. *Flowers* in umbels of (2)–4–(6), very rarely solitary, pedicels covered with long simple hairs. *Sepals* 5, lanceolate or narrow oblong, 0.6–1.0 cm. long, 0.2–0.3 cm. wide, hirsute with long suberect white simple hairs and very short glandular hairs where exposed in bud, shortly mucronate, ciliate and membranous towards margin especially where covered in bud. *Petals* 5, blue-purple with yellow or white veins and base, elongate-ovate, c. 1.0 cm. long and 0.5 cm. wide. *Stamens* 5; filaments oblanceolate or narrow oblong, 0.4 cm. long, 0.15 cm. wide, acuminate-aristate with an awn c. 0.1 cm. long; anthers yellow; staminodes 5, ovate-triangular, 0.15 cm. long, 0.15 cm. wide, almost obtuse, occasionally toothed, $1/3$ – $1/2$ as long as staminal filament. *Stigmata* 5, yellow. *Mericarps* 5, oblanceolate-obovoid, 0.65 cm. long and 0.15 cm. wide, covered with long white simple hairs appressed diagonally to long axis; beak 4.0–7.0 cm. long with two pits at base and often two folds beneath each pit.

Chromosome number: $2n = 40$.

Range: Extra-tropical southern and eastern Australia, extending to the Musgrave Ranges, Queensland, and rarely found in Western Australia.

Ecological distribution: Generally in open situations.

Holotype: Butler's Peak Range, Fowler's Gap. R. Carolin, June, 1956. No. E5. In Herb. N.S.W.

The species is quite variable, although the variants grade imperceptibly into one another. For this reason no subspecific taxa are recognized. The specimens from Western Australia, where the species seems to be distinctly uncommon, tend to have virtually glabrous pedicels and larger staminodes than the type. Towards the east coast the leaves tend to be more dissected and the lobes somewhat narrower than in the type. Near Adelaide and in the Murray "desert" the mericarp hairs tend to be divergent and closely resemble those of *E. cygnorum* Nees in Lehm. ssp. *cygnorum*.

Specimens examined.—WESTERN AUSTRALIA: Main Camp Kurrawang, J. H. Maiden, Sept., 1909 (N.S.W.); Toodgay, W.A., Oldfield (MEL). SOUTH AUSTRALIA: Ernabella Station, E. E. Lord, 17.4.1950 (MEL); between Youldeh and Charlotte Waters, E. Giles (MEL); Lake Letty, Crocker, 8.8.1939 (S.A.95640004); between Blinman and Wirrealpa, east of Lake Torrens, Cleland, 1.12.1930 (S.A.95641032); Gawler Ranges, Lincoln Gap, Cleland, 24.9.1942 (S.A.95641017); Flinders Range, Quorn, Cleland, 3.10.1945 (S.A.95641013); Flinders Range, Dr. Murray, Howitt Exped. (MEL); Mt. Lyndhurst, Max Koch, Aug., 1898, no. 196 pro parte (Q.001868); S. Flinders Range, Gladstone, Black, 9.9.1932 (S.A.95641009); Koonamore Vegetation Reserve, Paltridge, 17.9.1928 (S.A.95640008); Koonamore, S.E. part of Vegetation Reserve, Eichler, 14.8.1956, no. 12452 (S.A.95641046); Koonamore, N.W. part of Vegetation Reserve, Eichler, 15.8.1956, no. 12499 (S.A. 95641047); Gammon Ranges, Arcoona Bluff, Eichler, 15.9.1956, no. 12635 (S.A.95641048); Carroona, Cleland, June, 1885 (S.A.95641039); between Wintinna and Marble Creek, J. M. Becharraise (MEL); Deep Creek, 5 miles east of Barra, Cleland, 24.8.1946 (S.A.95641029); Marino, Cleland, 10.9.1955 (S.A.95641025); Karoonda, Black, 5.10.1915 (S.A.95641009); Nonning, Cleland, 25.8.1928 (S.A.95641018); Nonning, Dr. Pulleine, May, 1931 (S.A.95641045); Adelaide University grounds, Cleland, 5.9.1934 (S.A.95641012); near Adelaide, F. v. Müller, Sept. 16, 1848, and Aug., 1848 (MEL); Brighton, Black, 9.1904 (N.S.W.); Encounter Bay, near Callistemon Swamp beyond Bluff, Cleland, 19.8.1947 (S.A.95641030); Hills above Encounter Bay, Cleland, 12.9.1945

(S.A.95641038); Adelaide-Melbourne, Kinchina, Cleland, 8.11.1924 (S.A.95641040); Eyre's Peninsula, 30 miles west of Kimba, Cleland, 14.11.1955 (S.A.95641024); towards Spencer's Gulf, Warburton (MEL); Kangaroo Island, Waterhouse (MEL). NORTHERN TERRITORY: Ayers Rock, R. Carolin, 21.6.1956, no. 76. VICTORIA: Nandoorringa Creek, Vict. Exploring Exped., Dec. 24.1860 (MEL); Shire of Dimboola, F. M. Reader, 26.8.1900 and 15.10.1887 (MEL); Grassy places around Port Phillip (MEL); Campaspe, Bathouse (MEL). NEW SOUTH WALES: Tibooburra, O. E. Conch, 8.1930 (N.S.W.); W. of Nyngan,



Text-figs. 1-7. *E. crinitum* Carol.—1, Flower bud; 2, Stamen filament; 3, Staminode; 4-5, Leaves; 6, Mericarp; 7, Hairs.

Text-figs. 8-14. *E. aureum* Carol.—8, 10, Stamen filaments; 9-11, Staminodes; 12, Flower bud; 13, Mericarp; 14, Leaf.

I. Pidgeon and J. Vickery, 19.8.1939 (N.S.W.); Nyngan, J. L. Boorman, 8.03 (N.S.W.); Sunny Corner, J. L. Boorman, 11.99 (N.S.W.); Tilpa, G. Turner, 5.1911 (N.S.W.); Thuddingra, G. W. Caldwell, 16.12.1954 (N.S.W.); Boppy Mountain, near Cobar, J. L. Boorman, 7.03 (N.S.W.); Narromine, J. H. Maiden, 9.98 (N.S.W.); Narrabri, E. Breakwell, 9.13 (N.S.W.); Toonale-Goonery, J. L. Boorman, 10.1912 (N.S.W.); Marsdens, Messrs. Bloomfield, 10.12 (N.S.W.); Gilgandra, J. D. Simon, 10.1913 (N.S.W.); Gunnedah, Narr, 7.3.1841 (N.S.W.); Ardlethan, R. H. Cabbage, 30.9.16 (N.S.W.); Jerilderie, Bishop Dwyer, 10.1920 (N.S.W.); Waldoorah, Baracuba, R. D. Hay, Sept., 1903 (N.S.W.); Canundia, J. Garden, 7.10.1949 (N.S.W.); Walgett, A. B. Little, 10.99

(N.S.W.); Culgoa River, T. S. Webb, 8.1901 (N.S.W.); Bingara, Miss P. M. Blundell, 5.1911 (N.S.W.); Boggabri, R. H. Cabbage, 10.1912, no. 3624 (N.S.W.); Mugerie, Coonamble, C. Featherstonehaugh, 7.1913 (N.S.W.); Plains of the Condamine, Timbe, Dr. Lohb (Syd. Univ.); Coolabah, R. W. Peacock, 9.98 (N.S.W.); Fifield, R. H. Cabbage, 9.1908, no. 1951 (N.S.W.); Mookoo, near Garah, R. H. Cabbage, 19.2.22 (N.S.W.); Condobolin, E. Breakwell, Aug., 1913 (N.S.W.); 4 miles reserve, Condobolin, N. C. Beadle, 8.45 (Syd. Univ.); Yanco Experimental Farm, H. Wenholz, 2.1913 (N.S.W.); Yanco Experimental Farm, E. Breakwell, Nov., 1913 (N.S.W.); Temora, Rev. J. Dwyer, 9.15 (N.S.W.); Wentworth, Mrs. Forde (MEL); Sandhills near the Darling River, Dr. Beckler (MEL); River Darling, Vict. Exploring Exped. (MEL); Darling River, Mr. Neilson (MEL); east of Broken Hill, N. C. Forde, 31.8.46 (N.S.W.); Broken Hill, A. Morris, 5.7.1920, 2506/r0 (N.S.W.); Ivanhoe, E. H. Crisp, Rod. Herb. no. 11167 (N.S.W.); Hay, J. J. Fletcher, Sept. 22, 1889 (N.S.W.); Henty, E. J. McBarron, 15.2.1949, no. 3079 (N.S.W.); Griffith, S. A. Blakely and D. W. Shiress, 7.1928 (N.S.W.); Railway enclosure, Culcairn, E. J. McBarron, 2.9.1949, no. 3542 (N.S.W.); Narrandera, E. J. McBarron, 6.11.48, no. 2480 (N.S.W.); New England, A. Norton (Q.001878); Tamworth, R. H. Goode, 10.11.1954, no. 95a (N.S.W.); Belltrees, near Scone, H. L. White, Feb., 1920, no. 47 (N.S.W.); Scone, E. Breakwell, 8.13 (N.S.W.); Dubbo, J. L. Boorman, 8.03 (N.S.W.); South Mudgee, M. Tindale, 6.10.1953 (N.S.W.); Pennant Hills, L. Fraser, 1934 (N.S.W.); Concord West, O. D. Evans, 27.10.1942 (Syd. Univ.); Arundale, Consett Davis, 4.2.41, Rod. Herb. no. 12064 (N.S.W.); Nowra, Rod. Herb. (N.S.W.); Bega, E. Breakwell, Dec., 1913 (N.S.W.). QUEENSLAND: Charleville, Dr. A. J. Turner, 9.02 (Q.001871); Charleville, E. W. Bichae, Dec., 1916 (Q.001878); Roma, R. E. Soutter, Oct., 1924 (Q.001872); Bungewagorai, R. E. Soutter, June, 1913 (Q.001867); Boatman Stn., S. L. Everist, 21.7.1947, no. 3108 (Q.001869); Boatman Stn., S. L. Everist, 25.4.1947 (Q.001890); Hermitage, near Warwick, H. S. Pink, Sept., 1947 (Q.001870); Yelarbon, C. T. White, 9.1919 (Q.001879); Darling Downs, about 3 miles south-east of Blaxland, L. S. Smith and S. L. Everist, 13.10.1940, no. 797 (Q.001888); Darling Downs, Goondiwindi, C. T. White, 28.9.1944, no. 12608 (Q.001887); Miles S2, E. H. Belson, 10.1930 (Q.001886); Northampton Downs, near Blackall, S. L. Everist, 26.8.1935, no. 1216 (Q.001884); Mitchell district, Blackall, S. L. Everist, 24.8.1955, no. 1228 (Q.001889).

ERODIUM CYGNORUM Nees in Lehm., *Plantae Preissianae*, 1: 162 (1844).

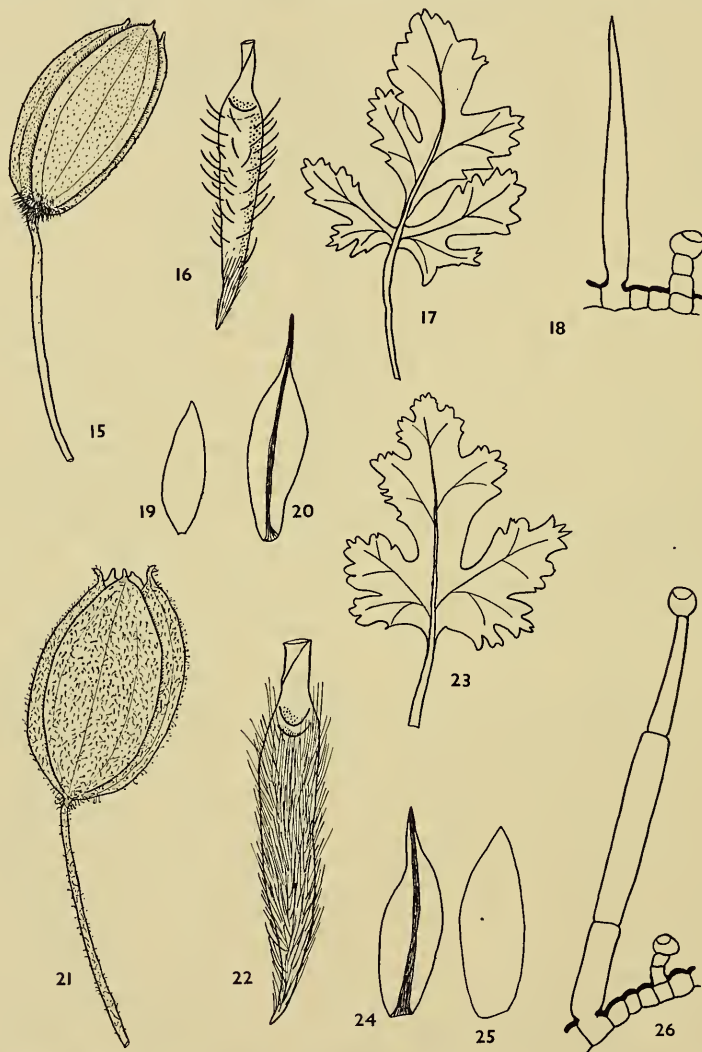
Sprawling or suberect herbaceous perennial with a thick fleshy tap-root. *Stems* 1-numerous, 5-60 cm. tall, covered with stiff white simple hairs or soft glandular hairs. *Leaves* 1.5-6.0 cm. long, 0.5-4.0 cm. wide with three principal lobes and simple or glandular hairs scattered over the surface; petioles slender, 2-13 cm. long; stipules and bracts acute. *Flowers* in umbels of 2-6, rarely solitary; pedicels almost glabrous or covered with soft glandular hairs. *Sepals* 5, oblong-lanceolate or oblong-elliptic, 0.5-1.3 cm. long, 0.2-0.7 cm. wide, covered with short white simple hairs or soft glandular hairs, mucronate, ciliate and somewhat membranous towards the margin, especially where covered in bud. *Petals* 5, blue-purple with red, yellow or white veins and base, ovate, 1.0-1.2 cm. long, 0.5-0.7 cm. wide. *Stamens* 5; filaments oblanceolate to lanceolate, 0.4 cm. long, 0.15 cm. wide, occasionally toothed; anthers red or yellow; staminodes 5, oblong-lanceolate to lanceolate, 0.25-0.35 cm. long, 0.1-0.15 cm. wide. *Carpels* 5, hairy; stigmata 5, red or green. *Mericarps* 5, obovoid to oblong, c. 1.0 cm. long, 0.15-0.2 cm. wide, covered with long simple divergent or erect hairs; beak 5.0-12.0 cm. long, with two pits at base and 1-2 folds often beneath each pit.

Ssp. CYGNOGUM.

Herbae perennes suberectae simplicibus pilis albis rigidis instruntur. Folia triloba profunde plerumque ad nervam primam. Pedunculi graciles basi glabri hirsuti summis. Sepala oblonga vel oblongo-lanceolata pilis brevissimis rigidis confertis appressis instruntur. Filamenta staminorum oblanceolata anguste acuminata, 1 1/2-plc longiore staminodia. Staminodia lanceolata. Mericarpium pilis rigidis longis divergentibus et interdum brevioribus aliquot obtegitur.

Stems 1-numerous, 5-35 cm. tall with stiff white simple hairs scattered over surface. *Leaves* 1.5-4.0 cm. long, 0.5-3.0 cm. wide, deeply dissected with three principal lobes;

median lobe 1.5-4.0 cm. long, 0.3-2.0 cm. wide; sinuses reaching to main vein, white simple hairs scattered over surface; petioles slender, c. 2.0 cm. long with scattered white simple hairs, especially in the groove, and very minute glandular hairs; stipules and bracts acute. *Flowers* in umbels of (2)-3-(5) rarely solitary; pedicels almost completely glabrous but with numbers of short white simple hairs immediately below calyx. *Sepals* 5, oblong or oblong-lanceolate, (0.5)0.7-0.9 cm. long, (0.2)0.3-0.4 cm.



Text-figs. 15-20. *E. cygnorum* Nees in Lehm. ssp. *cygnorum*.—15, Flower bud; 16, Mericarp; 17, Leaf; 18, Hairs; 19, Staminode; 20, Stamen filament.

Text-figs. 21-26. *E. cygnorum* ssp. *glandulosum* Carol.—21, Flower bud; 22, Mericarp; 23, Leaf; 24, Stamen filament; 25, Staminode; 26, Hairs.

wide, covered with short appressed white simple hairs, mucronate, ciliate and membranous towards margin, especially where covered in bud. *Petals* blue-purple with yellow or white veins and base, ovate, c. 1.0 cm. long and 0.5 cm. wide. *Stamens* 5; filaments oblanceolate or narrow oblong, 0.4 cm. long, 0.15 cm. wide, acuminate-aristate; anthers yellow; staminodes lanceolate, 0.25 cm. long, 0.1 cm. wide, 2/3 times as long as staminal filaments. *Mericarp* obovoid, (0.6)0.8-1.0 cm. long, 0.15-0.2 cm. wide,

covered (usually sparsely) with long stiff spreading hairs often with a complement of shorter hairs, densely hairy at base where hairs are erect; beak 5.0-10.0 cm. long.

Chromosome number: $2n = 60$.

Range: Mostly extra-tropical Western Australia as far east as Lake Gilles in South Australia and extending northwards to Onslow in the tropics and Ayers Rock.

Ecological distribution: Generally in open situations and possibly showing a preference for sandy soils.

Holotype: In depressis arenosis umbrosis ad flumen Cygnorum supra oppidulum Perth, Augusto 1839. Preiss no. 1902.

It has been impossible to trace this specimen, although enquiries have been made at the following European herbaria in addition to the Australian institutes (the abbreviations are those recommended in the current "Index Herbariorum"): B, BM, FI, G, GB, GOET, HBG, K, KIEL, LE, NBV, P, U, UPS, W, WU. It was possibly housed at Berlin-Dahlem and was destroyed during the 1939-46 war. The description is hardly adequate to decide to which taxon the type belonged. "sepalò . . . tota superficie pilis brevissimis" and the locality from which it was taken indicate that the taxon described above is probably the one concerned. It is fairly certain that the type is lost and due to the inadequacy of the type description it is necessary to erect a neotype. Unfortunately none of the specimens from the Swan River which were examined were in any way complete and a specimen from another locality has had to be selected.

Neotype: 3 miles S. of Morawa, C. A. Gardner, 26 Aug., 1945, no. 7526. In Herb. W.A.

Specimens examined.—WESTERN AUSTRALIA: Lakeside, ex Herb., W. V. Fitzgerald, Aug., 1898 (N.S.W.); S. of Onslow, C. A. Gardner, Aug., 1932, no. 3063 (W.A.); Murchison River and north of Murchison, Oldfield, pro parte (MEL); north of Murchison, Oldfield (MEL); Tamala Stn., Hamelin Pool, C. H. Roberts, Aug., 1937 (W.A.); Gascoyne River, near Jimba-Jimba, C. A. Gardner, 1941 (W.A.); Yorkakrine, C. A. Gardner, Sept., 1920 (W.A.); Yorkakrine, near Tammin, C. A. Gardner, Aug., 1920 (W.A.); Merredin, C. A. Gardner, Aug., 1920 (W.A.); 30 miles east of Meekathera, C. A. Gardner, July, 1931, no. 2374 (W.A.); Yandanooka, R. Morrison, Sept., 1904 (W.A.); Goomalling, C. A. Gardner, Aug., 1920, no. 648 (W.A.); Sturt Meadows Stn., C. E. Brockway, Oct., 1943 (W.A.); Mt. Magnet, W. S. Macpherson, 1897 (MEL); west from Middle Mount Barren (MEL); Stirling Ranges (MEL); Basalt Ridge north of Stirling Ranges, F. v. Mueller (?) (MEL); Mount Morgan S., Dr. H. J. Mitchell, 8.1913 (N.S.W.); Comet Vale, J. T. Jackson, 12.1916 (N.S.W.); Laverton, Maiden, 1909 (N.S.W.); banks of the Salt River, Max, no. 94 (MEL); Tone River, Oldfield, no. 122 (MEL); Glenorn Stn., N. T. Burbidge, Aug., 1938 (W.A.); Coolgardie, A. J. Vaga, 1896 (N.S.W.); Kurrawang, J. Burton Cleland, 5.1907 (N.S.W.). SOUTH AUSTRALIA: Ooldea Soak, Cleland, 22.8.1939 (S.A.); Ooldea, E. H. Ising, 13.9.1920, no. 1612 (N.S.W.); Tarcoola, E. H. Ising, 5.9.1920, no. 1191 (Q.001873); Lake Gairdner, Babb. Exped. (MEL); Lake Giles, S. Burkitt (MEL). NORTHERN TERRITORY: Ayers Rock, Maggies Spring, G. Chippendale (N.S.W.).

Ssp. GLANDULOSUM, ssp. nov.

Herbeae perennes pilis glandulosis confertis instruntur. Folia triloba autem nunquam ad nervam primam. Pedunculi sepalaque oblongo-ellipticae pilis glandulosis obteguntur. Staminodia aequae filamentis staminorum. Pili longi appressi obtegunt dense mericarpium.

Stems 1-numerous, 10-60 cm. tall, covered with soft glandular hairs. *Leaves* 2-0 cm. long, 1.0-4.0 cm. wide, lobed with three crenate principal lobes, sinuses never reaching midrib, hairs almost all glandular on both surfaces; petioles slender, 2-13 cm. long, glandular hairy, except in groove which has long stiff simple hairs; stipules and bracts acute. *Flowers* in umbels of 2-6, very rarely solitary; pedicels slender, glandular hairy. *Sepals* 5, oblong-elliptic, (0.6)0.8-1.3 cm. long, (0.3)0.4-0.7 cm. wide, covered with soft glandular hairs and very few or no simple hairs, membranous and ciliate towards margin, especially where covered in bud. *Petals* 5, blue-purple with red veins

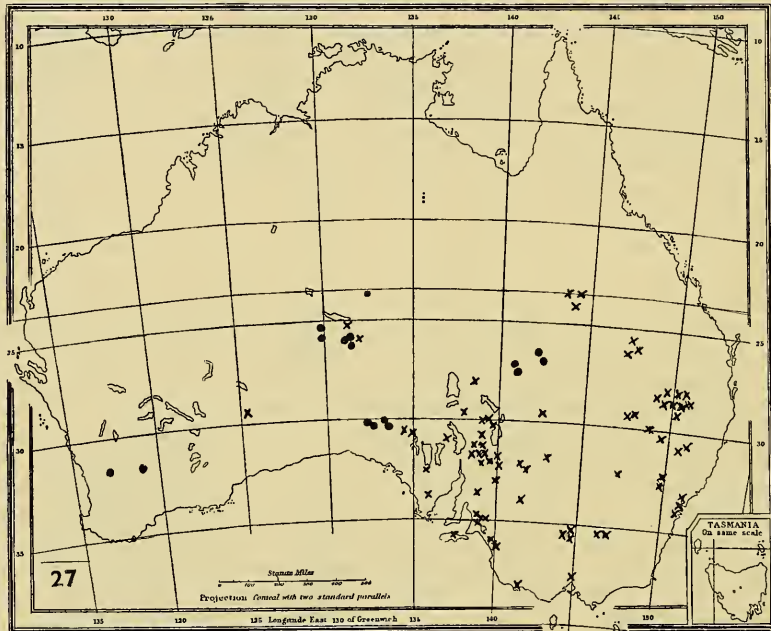
and base, ovate, c. 1.2 cm. long and 0.7 cm. wide. *Stamens* 5; filaments lanceolate or narrow oblong, 0.4 cm. long, 0.15 cm. wide, acute, occasionally toothed; anthers red; staminodes 5, oblong-lanceolate, 0.35 cm. long, 0.15 cm. wide. *Stigmata* 5, red. *Mericarps* 5, oblanceolate or oblong, c. 1.0 cm. long and 0.2 cm. wide, covered with long white-brown simple hairs appressed for the most part parallel to the long axis; beak 6.0-10.0 (12.0) cm. long.

Chromosome number: $2n = 60$.

Range: Mostly drier parts of extra-tropical South Australia extending to just north of Alice Springs, westwards to Tarcoola and eastwards to the Darling River.

Ecological distribution: Generally in open situations.

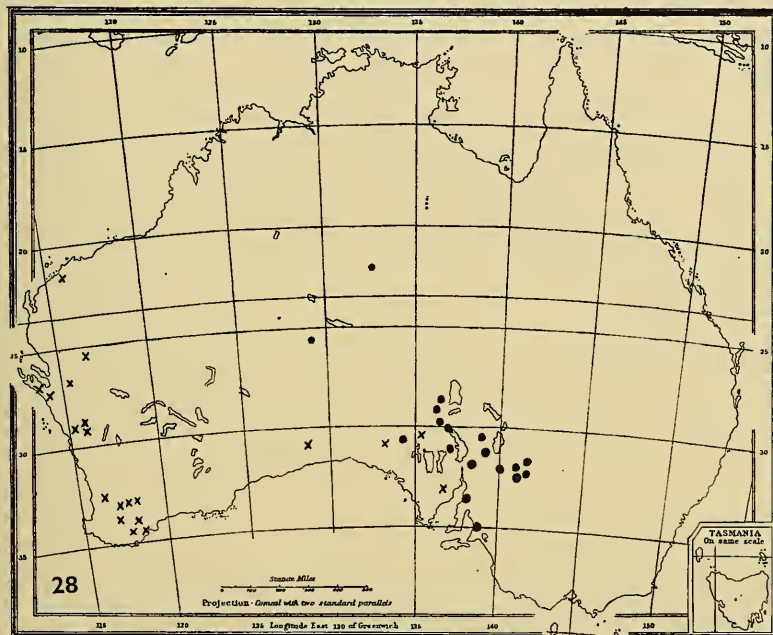
Holotype: Butler's Peak Range near Fowler's Gap. Damp col in the ranges, 1200 ft. R. Carolin, June, 1956, no. E4. In Herb. N.S.W.



Text-fig. 27. Distribution of *E. aureum* Carol. ● and *E. crinitum* Carol. ×.

Specimens examined: SOUTH AUSTRALIA: Mt. Davis, border of S.A., N.T., and W.A., Mrs. A. T. Reid, 9.1955 (N.S.W.) (see notes); Anna Creek, William Creek, Cleland, 10.9.1930 (S.A.95641027); Warburton River, Cowarie Stn., Crocker, 24.7.1939 (S.A.95640003); Arcoona, Murray, 9.8.1927, no. 83 (S.A.95640002); Cootanoorinna Creek, Helms, 7.5.1891 (S.A.95640010); Railway line, Alice Springs to Adelaide, Irrapatanna, Cleland, 25.8.32 (S.A.95641033); Curdimurka, Knox College Exped. no. 4, 1.9.1950 (N.S.W.); Leigh Creek, Dr. R. S. Rogers, 9.10 (N.S.W.); Lake Eyre, Prof. Baldwin Spencer, 9.03 (N.S.W.); Alice Springs to Marree, Melbourne Ward, Aug., 1947 (Syd. Univ.); Curnamona Stn., M. Pinches, 1931 (S.A.95641031); Gammon Ranges, Arcoona Pound, c. 6 miles east of Oulanduina Outstn., Eichler, no. 12637 (S.A.95641049); Flinders Range, near the road Hawker-Blinman, c. 4 miles after Wilpena, Eichler, 11.9.1956, no. 12537 (S.A.95641050); Mt. Lyndhurst, Max Koch, June, 1899, no. 196, pro parte (MEL); Koonamore, T. G. B. Osborn, 5.1928 (Syd. Univ.); N. of Fowler's Bay, E. Giles, 1875 (MEL). NEW SOUTH WALES: Broken Hill district, A. Morris, 28.8.21 (N.S.W.); Broken Hill, I. Pidgeon and J. Vickery, 23.8.1939 (N.S.W.); Broken Hill-Menindie road, R. J. Constable, 19.7.1955 (N.S.W.); Broken Hill, E. C. Andrews, 9.1918 (N.S.W.); Thompson Siding, Broken Hill, A. Morris, 19.8.1928, no. 2373 (Q.001883); Yanco Glen, P. Brough and N. C. Beadle, 26.8.1939 (Syd. Univ.); Umberumberka, L. A. S. Johnson, 29.8.1946 (N.S.W.).

These two subspecies appear to be geographic differentiates of one species despite their very distinctive characters. In the regions where their distributions abut or overlap, i.e., west of Lake Eyre in particular, the distinction becomes a little blurred. Most of the specimens from this region are referred to ssp. *glandulosum* Carol. but the hairs on the mericarps resemble those of ssp. *cygnorum* very closely. The specimen "Mt. Davies, Mrs. A. T. Reid, 9.1955 (N.S.W.)" in particular shows a mixture of the characters of the two ssp. The indumentum is almost wholly glandular and the pedicels are hairy, whereas the leaves are dissected to the midrib and the mericarp hairs are divergent and scanty. The two ssp. have been crossed and apparently viable seed has been produced but, unfortunately, the seeds died before flowering. The specimen from Mt. Davies mentioned above has well-formed seeds on it and it would appear that the hybrid is viable.



Text-fig. 28. Distribution of *E. cygnorum* Nees in Lehm. ssp. *cygnorum* × and ssp. *glandulosum* Carol. ●.

All these taxa have been grown in Sydney. *E. crinitum* Carol. alone produced good growth and this species is found locally native. The others retained their characteristics. Crosses were attempted between them but apart from the results mentioned above no hybrid seeds were obtained. No intermediates between the species have been observed in the herbarium specimens examined and, indeed, should they occur they would in general be sterile, assuming that the chromosome numbers reported here are constant.

These taxa probably represent a fairly discrete unit within the genus. A relationship with *E. malacoides* Willd. may exist; this species extends into South Africa but it appears to be an introduction there and it is essentially a European species. The taxonomic position, then, must remain indefinite for the time being.

The diploid species is found in the arid areas, which suggests that, if the group has a common origin in Australia, the genus entered Australia from an arid region at a time when parts of the continent at least were arid. The apparent absence of any of the species described above from the more northerly part of the arid area would indicate that the genus may have entered the continent when the north was somewhat cooler or from another direction altogether. Long-range dispersal of arid plants over more clement regions is not likely. The polyploid species, particularly the

tetraploid *E. crinitum* Carol., are more tolerant to differing ecological conditions than *E. aureum* Carol. and are rather more abundant in the damper southern areas of the continent, although they do occur in the arid areas. The hexaploid *E. cygnorum* Nees in Lehm., at least, evolved prior to the last floristic separation of the south-west from the rest of the continent when two subspecies differentiated on either side of the barrier. The aridity of mid-Recent times may have been this barrier, as these species cannot exist under extremely arid conditions.

NOMEN DUBIUM.—*E. PERISTEROIDES* Turcz. in *Bull. Soc. Imp. Nat. Mosc.*, 36: 592 (1863).

Holotype: In Nova Zeelandia vidi specimina plurima in collectionibus All. Cunninghamii et Ev. Homei.

Knuth in "Das Pflanzenreich" cites this name as a synonym of *E. cygnorum* Nees in Lehm. There is a good deal of confusion about this name. The Manual of the New Zealand Flora by Cheesman does not mention either as occurring in that country and it does not appear to have been reported. Without a specimen definitely named by Turczaninow it would seem impossible to draw any conclusions with regard to type specimen(s). No such specimen has been found in Leningrad, Moscow, Kiev, Kew or London. Dr. R. Melville has suggested that the country of origin cited for *E. peristeroides* Turcz. is an error and that it is possible that the description applies to a *Pelargonium*. The "sepala acuta . . . Petalo primo alba dein rosea, unguiculata subspathulata . . . ovarium glabrum" preclude this specimen from all the indigenous or introduced Australian species of *Erodium* and certainly indicate *Pelargonium* as the source of the material.

Key to the Australian Species of Erodium L'Hér. Including Introduced Taxa.

1. Leaves pinnate-compound.
 2. Leaflets very deeply pinnately lobed (often cut to the main vein) *E. cicutarium* (L.) L'Hér. ex Ait.
 - 2§. Leaflets toothed or lobed but rarely dissected more than halfway to the main vein *E. moschatum* (L.) Ait. introd.
- 1§. Leaves palmate or ternate compound or lobed or pinnate lobed.
 3. Leaves very slightly lobed, ovate; beak of mericarp 2-3 cm. long *E. malacoides* Willd. introd.
 - 3§. Leaves deeply lobed, dissected or compound; beak of mericarp more than 3 cm. long.
 4. Leaves pinnate-lobed, basal lobes about the same size as subsequent lobes; staminodes less than half as wide as staminal filaments *E. botrys* (Cav.) Bertol. introd.
 - 4§. Leaves palmate-ternate, rarely pinnately, lobed with basal lobes larger than subsequent ones; if leaves pinnately lobed staminodes as wide as staminal filaments.
5. All calyx hairs simple except the most minute ones (invisible except under high magnification); leaves deeply dissected.
 6. Hairs of calyx scarcely appressed, long, staminal filaments 3-2 times as long as staminodes; mericarp hairs appressed diagonally *E. crinitum* Carol.
 - 6§. Hairs of calyx short, appressed; staminal filaments one and a half times or equally as long as staminodes; mericarp hairs divergent *E. cygnorum* Nees in Lehm. ssp. *cygnorum*.
- 5§. Visible calyx hairs glandular often mixed with some simple hairs or all glandular; leaves lobed.
 7. Staminal filaments oblong, acuminate; sepals almost devoid of simple hairs; mericarp hairs erect or slightly divergent *E. cygnorum* ssp. *glandulosum* Carol.
 - 7§. Staminal filaments lanceolate, aristate; sepals covered with both simple and glandular hairs (former often towards apex); mericarp hairs appressed diagonally *E. aureum* Carol.

The Government Botanists of each State have helped considerably by the prompt and protracted loan of specimens. Dr. R. Melville, of Royal Botanic Gardens, Kew, has kindly sent me descriptions and notes which were unobtainable in Australia, and Mrs. M. Thompson, of the National Herbarium of N.S.W., Sydney, has read the MS. and made a number of suggestions. A grant from the Research Committee of the University of Sydney enabled some of the material to be collected.